

REMARKS

Formal Matters

Claims 1-23 are rejected. Claims 24-37 have been withdrawn from consideration pursuant to the Response to Restriction Requirement filed September 27, 2007.

Claims 1 and 24 have been amended to recite certain features of claim 21 as well as the feature that the active layer is a single quantum well structure formed of a single well layer or comprises at least one well layer in a multiple quantum well structure, the active layer comprising a thick portion and a thin portion, and the thick portion being disposed irregularly within a single well layer. Support may be found, for example, on page 14, lines 10-31 of the specification as well as in Figs. 1 and 2.

No new matter has been introduced. Entry and consideration of the amendments are respectfully requested.

Applicants respectfully request the Examiner to return initialed Form SB08 for the Information Disclosure Statement filed August 1, 2008.

Response to Rejection under 35 U.S.C. § 103

Claims 1-23 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Publication 2005/0026399 A1 to Chien et al. ("Chien") in view of U.S. Patent Application Publication 2004/0099858 A1 to Lee et al. ("Lee").

Chien was cited as teaching a substrate, and an n-type layer, an active layer, and a p-type layer formed on the substrate, the active layer being sandwiched by the n-type layer and the p-type layer (Office Action, p. 2). The Examiner, however, acknowledged that Chien does not teach an active layer comprising a thick portion and a thin portion, wherein the active layer has a flat lower surface (on the substrate side) and an uneven upper surface so as to form the thick

portion and the thin portion (Office Action, p. 2). The Examiner cited Fig. 9, [0052], and [0057] of Lee as teaching a quantum dot active layer 34 within the scope of the claimed active layer.

The reason for rejection was that it would have been obvious to modify Chien's device to employ the quantum dot well layer 34d1 of Lee having a flat bottom surface (on the substrate side) and a thick portion and a thin portion top surface *to adjust the energy level within the active layer*, citing paragraph [0052] of Lee.

On pages 5-6, the Examiner responded to Applicants' Amendment of August 1, 2008 and indicated the following:

(A) Lee meets the amended claims because Lee discloses that the active layer 34 includes quantum dot layer 34d1 to 34d3 of differing size on the same layer and which are irregularly disposed ([0054]; Fig. 9). The Examiner also noted that Figs. 1 and 2 of the present application are unclear such that it is difficult to distinguish the thick portions from the thin portions, and suggested that further amendment of the claims is needed to (structurally) distinguish over Lee.

(B) The combination of Chien and Lee is proper because Chien discloses all the limitations in claim 1 except the different thickness portions in the active layer; Lee discloses the active layer has different thickness (Lee fig. 9); and Lee provides a motivation to combine, which is to use the quantum dots to adjust the energy level within the active layer (Lee [0052]).

Applicants respond as follows.

1) Lee does not teach the structural features of the active layer as claimed. The invention disclosed in Lee relates to an optical amplifier. The optical amplifier is a device for amplifying an optical signal having an energy level constituting a quantum dot active layer and the energy level constituting the quantum dot active layer may be adjusted by adjusting the size of a quantum dot (see paragraph [0051] and [0052] of Lee). Therefore, in order to amplify a

light having a specific wavelength, all the quantum dots *in a single layer must have same size*.

The quantum dot active layer shown in Fig. 9 and Fig. 10 of Lee has a structure in which quantum dots having the same size are arranged at the same distance in a single layer.

On the other hand, the active layer of amended claim 1 of the present invention comprises a thick portion and a thin portion which are disposed *irregularly within a single well layer*. On this point, the active layer of the present invention has a different structure from that of the quantum dot active layer disclosed in Lee.

Applicants submitted replacement drawings on January 14, 2008. To further aid examination, Applicants submit hand-rendered schematic drawings of Figs. 1 and 2 which clearly show active layer 1, barrier layer 4 and thin portions A, B and C. The schematic drawings show the thick portions being disposed irregularly within the active layer as required by present claim 1. The schematic drawings are not intended to replace the figures of record.

2) Further, the materials composing the active layer of Lee and the wavelength of amplified light are also different from those of the present invention. In Lee, materials composing an active layer are AlGaAs and InGaAs and amplified light is infrared light having wavelength more than 1000nm as shown in Fig. 12 of Lee. On the other hand, in the present invention, materials composing an active layer are gallium nitride compounds and emitted light is visible light having wavelength of 455nm or 470nm as shown in Examples 1 and 2 of the present specification. Therefore, even if the device disclosed in Chien is combined with the active layer disclosed in Lee, the present device is not obtained.

3) Further still, the motivation cited by the Examiner to combine the teachings of Chien and Lee is deficient. On page 6 of Office Action, the Examiner asserted that Lee provides a motivation to combine, which is using the quantum dots to adjust the energy level within the

active layer. However, in a gallium nitride compound semiconductor light-emitting device as in Chien, the energy level within the active layer is adjusted by In content in the active layer composed of GaInN. Therefore, a skilled artisan would not have been motivated to employ a quantum dot layer to adjust the energy level within the active layer as suggested by the Examiner.

In contrast, an object in which the active layer comprising a thick portion and a thin portion is employed in the present invention is not to adjust the energy level within the active layer, but to operate at low voltage while maintaining satisfactory light emission output.

Reconsideration and withdrawal of the rejection are respectfully requested.

Withdrawn method claims 24-37 have been amended to include all of the limitations of device claim 1. Therefore, if claim 1 is found to be allowable, Applicants respectfully request rejoinder of the withdrawn method claims pursuant to MPEP § 821.04.

Withdrawal of the foregoing rejection under 35 U.S.C. § 103(a), rejoinder of the withdrawn method claims and allowance of claims 1-20 and 22-37 is earnestly solicited.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,


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CUSTOMER NUMBER

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